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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,076	04/07/2006	Shin-ichi Orimo	289507US0PCT	8667
22850	7590	04/03/2009		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
ANGADI, MAKI A				
ART UNIT		PAPER NUMBER		
1792				
NOTIFICATION DATE		DELIVERY MODE		
04/03/2009		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

## Application No.

10/575,076

## Applicant(s)

ORIMO ET AL.

## Examiner

MAKI A. ANGADI

## Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2006.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-6, 8-10, 13 is/are rejected.  
7) ☒ Claim(s) 7, 11, 12 and 14-16 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 07 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO/SB-08)  
Paper No(s)/Mail Date 8/7/06  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 7, 11, 12, 14 15 and 16 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims 7, 11, 12, 14 15 and 16 have not been further treated on the merits.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-2, 5, 8-10 are rejected under 35 U.S.C. 103(a) over Vaarstra et al. (US Patent No. 5,874,131) in view of Rao et al. (US Patent No. 7,241,479).

*As to claims 1-2 and 5,* Vaartstra discloses a complex hydride film using a Group III metal complex (col.2, lines 13-15) with homogeneous structure (col.5, lines 21-31), the light element complex hydride composes of a light weight metal having a low melting point such as aluminum (col.2, lines 28-31), elemental hydrogen with empirical formulas (col.4, lines 28-34) and element such as aluminum (col.4, line 34) having hydrogenated homogeneous phase of complex hydride (col.8, lines 26-39) and film thickness in the range of 0.5-1.5  $\mu\text{m}$  (col.8, lines 52). One who is skilled in the art should be able to increase film thickness by adjusting deposition parameters such as temperature and duration of deposition.

Vaarstra does not explicitly disclose the formation of a nanostructure but discloses the use of CVD techniques for fabricating complex metal hydride films. However, Rao discloses the use of CVD technique for fabricating nanostructures by heating the metal to a temperature above the melting point (col.1, lines 59-64). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ CVD process to fabricate nanostructures because Rao illustrates in Fig.1 that the fabrication of nanostructures using CVD process provide material with unique optical and electrical properties in the field of optoelectronics (col.1, lines 29-33).

*As to claims 8-10,* a method of manufacturing a complex hydride film (col.2, lines 13-15) characterized by the steps of: (a) forming on a substrate (16) a thin film (Fig.1) comprising of a light weight metal having a low melting point

such as aluminum (col.2, lines 28-31), by vacuum deposition in a reaction vessel, using the elements as the raw materials (col.10, lines 12-20) (b) introducing reactive gas e.g. hydrogen gas in the form of silane, hydrogen sulfide or hydrogen selenide into the reaction system to hydrogenate the film (col.5, lines 55-64), (c) synthesizing a light element complex hydride thin film composed of a homogeneous phase (col.6, lines 1-42).

Vaarstra does not explicitly disclose the formation of a nanostructure but discloses the use of CVD techniques for fabricating complex metal hydride films. However, Rao discloses the use of CVD technique for fabricating nanostructures by heating the metal to a temperature above the melting point (col.1, lines 59-64). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ CVD process to fabricate nanostructures because Rao illustrates in Fig.1 that the fabrication of nanostructures using CVD process provide material with unique optical and electrical properties in the field of optoelectronics (col.1, lines 29-33).

***Claim Rejections - 35 USC § 103***

3. Claims 3-4, 13, are rejected under 35 U.S.C. 103(a) as being obvious over Vaarstra et al. (US Patent No. 5,874,131) in view of Rao et al. (US Patent No. 7,241,479) as applied to claim 1 above, in further view of Bogdanovic (US Patent No. 4,554,152).

Vaarstra discloses the formation of metal hydride complex films that includes Group IIIA and Group IIIB metals but is silent about the use of alkali metal

or alkaline earth metal. However, Bogdanovic discloses the fabrication of magnesium hydride system as a highest energy hydrogen storage material (col.1, lines 18-28, col.3, and lines 10-20). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to select magnesium hydride films because Bogdanovic illustrates that  $MgH_2$  films can be used as high energy density hydrogen-storage system (col.1, lines 22-29).

#### ***Claim Rejections - 35 USC § 103***

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being obvious over Vaarstra et al. (US Patent No. 5,874,131) in view of Rao et al. (US Patent No. 7,241,479) as applied to claim 1 above, in further view of Wahl et al. (US Patent No. 4,321,163).

Vaarstra discloses the fabrication of complex hydride film but does not explicitly disclose hydrides listed in claim 6. However, Wahl discloses the use of hydrogen doped lithium nitride (col.1, lines 26-31). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ hydrogen doped lithium nitride because Wahl discloses that hydrogen doped lithium nitride provide highest ionic conductivity (col.1, lines 42-47).

#### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Back et al. (US Patent No. 5,922,926) discloses a method

and system for the destruction of hetero-atom organics using transition-alkaline-rare earth metal alloys.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MAKI A. ANGADI whose telephone number is (571)272-8213. The examiner can normally be reached on 8 AM to 4.30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Maki A Angadi/  
Examiner, Art Unit 1792

Art Unit: 1792

/Nadine G Norton/  
Supervisory Patent Examiner, Art Unit 1792